

Deep Network Radiative Transfer: A Revolution in Imaging Spectrometer Atmospheric Correction (ARC)

Completed Technology Project (2017 - 2018)



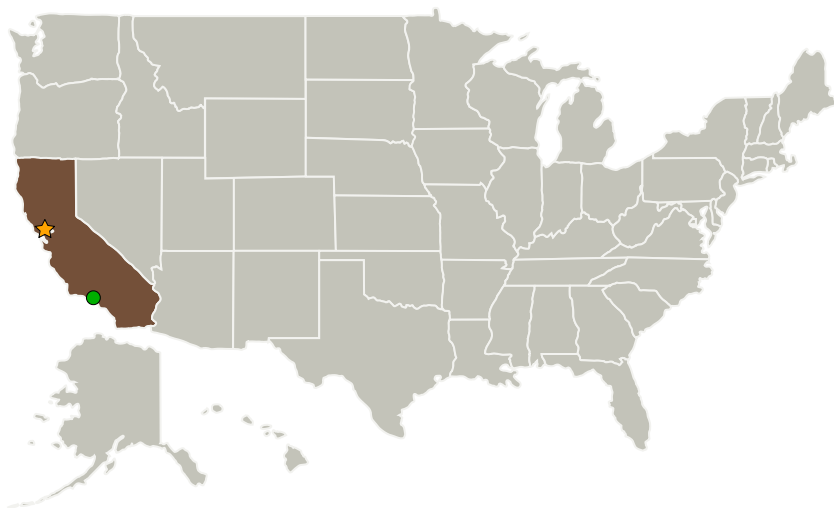
Project Introduction

Deep Neural Networks are trained on ARC supercomputer facilities to replicate the precise output of MODTRAN 6.0 calculation. The required training data is collected by running the inefficient MODTRAN 6.0. An appropriate deep neural network architecture in order to obtain the required accuracy in emulating MODTRAN 6.0 needs to be researched based on the science of the problem.

Anticipated Benefits

The current imaging spectrometer atmospheric corrections are either very slow or inaccurate. We emulate the slow but accurate physics based model using deep neural network. This will lead to fast and accurate correction models. We can achieve 2-3 order of magnitude speedup in VSWIR radiative transfer calculations, and overcome damaging approximations used in current codes (decoupled gas/scattering, fixed scattering AOD, etc.).

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California
Universities Space Research Association(USRA)	Supporting Organization	R&D Center	Huntsville, Alabama

Primary U.S. Work Locations

California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Center Innovation Fund: ARC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Harry Partridge

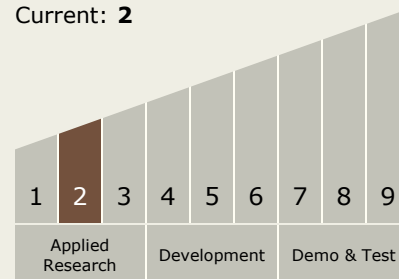
Principal Investigator:

Nikunj C Oza

Technology Maturity (TRL)

Start: 2

Current: 2



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.2 Modeling
 - └ TX11.2.4 Science Modeling

Target Destination

Foundational Knowledge